

CLAIMS

1. An improved reduced energy binder for energetic compositions comprising an amount of at least one relatively high molecular weight cured polyester polyol polymer in combination with an amount of one or more energetic plasticizers.

2. The reduced energy binder of claim 1 wherein the ratio of plasticizer to polymer is less than 1.6:1.

3. The reduced energy binder of claim 2 wherein the polyester polymer is cured using an amount of a polyisocyanate.

4. The reduced energy binder of claim 1 wherein the polyester polymer is cured using an amount of a polyisocyanate.

5. The reduced energy binder of claim 2 wherein the polyester polyol is poly(tetramethylene adipate) having a molecular weight (MW) of at least 4,000.

6. The reduced energy binder of claim 3 wherein the polyester polyol is poly(tetramethylene adipate) having a molecular weight (MW) of at least 4,000.

7. The reduced energy binder of claim 5 wherein the PTMA has a MW of at least 6,000.

8. The reduced energy binder of claim 6 wherein the PTMA has a MW of at least 6,000.

9. The reduced energy binder of claim ²⁵ wherein the energetic plasticizers are selected from nitrate esters of the group consisting of n-butyl-2-nitratoethyl nitramine; trimethylolethane trinitrate; triethyleneglycol dinitrate; butanetriol trinitrate; nitroglycerin and mixtures thereof.

10. The reduced energy binder of claim ¹³ wherein the energetic plasticizers are selected from nitrate esters of the group consisting of n-butyl-2-nitratoethyl nitramine; trimethylolethane trinitrate; triethyleneglycol dinitrate; butanetriol trinitrate; nitroglycerin and mixtures thereof.

11. The reduced energy binder of claim 9 wherein the plasticizer is selected from nitroglycerin, n-butyl-2-

nitratoethyl nitramine and trimethylolethane trinitrate.

12. The reduced energy binder of claim 10 wherein the plasticizer is selected from nitroglycerin, n-butyl-2-nitratoethyl nitramine and trimethylolethane trinitrate.

a 5 13. The reduced energy binder of claim ²⁵ 12 further comprising an amount of inert plasticizer.

14. The reduced energy binder of claim 13 wherein the inert plasticizer is triacetin.

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10 15. An improved propellant composition comprising a binder that includes a high molecular weight polyester polyol binder polymer including poly(tetramethylene adipate) having a molecular weight above 4000 and an energetic plasticizer wherein the plasticizer to polymer ratio is less than about 1.6:1.

15 16. The propellant composition of claim 15 wherein the energetic nitrate ester plasticizer is selected from nitroglycerin, n-butyl-2-nitratoethyl nitramine and trimethylolethane trinitrate.

a 20 17. The propellant composition of claim 16 wherein the binder polymer has a molecular weight ^(MW_n) of ^{at least} about 6,000.

18. The propellant composition of claim 17 further comprising an amount of triacetin plasticizer.

19. The propellant of claim 17 wherein the plasticizer to polymer ratio is about 1:1.

25 20. An improved high solids propellant composition comprising by weight:

(a) about 11% poly(tetramethylene adipate) MW 6,000 binder polymer;

(b) about 12% nitroglycerin plasticizer;

30 (c) about 22% aluminum; and

(d) about 53% ammonium perchlorate.

21. The propellant composition of claim 20 wherein nitroglycerin fraction is replaced by about 12% trimethylolethane trinitrate.

a 35 22. The propellant composition of claim ³⁷ 20 wherein (d) comprises about 30% ammonium perchlorate and about 22% sodium nitrate.

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